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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* GLENN DAVID CRABTREE, JAMES MATHIAS BOLAND,  
and JOHN D'ANGELO

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Appeal 2007-2286  
Application 09/610,094  
Technology Center 2100

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Decided: February 8, 2008

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*Before:* HOWARD B. BLANKENSHIP, ALLEN R. MACDONALD, and  
JEAN R. HOMERE, *Administrative Patent Judges.*

MACDONALD, *Administrative Patent Judge.*

DECISION ON APPEAL  
STATEMENT OF THE CASE

Appellants appeal a Final Rejection of claims 1-20 under 35 U.S.C.  
§ 134. We have jurisdiction under 35 U.S.C. § 6(b).

According to Appellants, they invented a method, computer program  
product, and system for calculating a radar cross section of an aircraft  
component. (Spec. 3:20-21.)

Exemplary claim 1 is reproduced below:

1. A method of calculating a radar cross section of an aircraft component having an axi-periodic structure comprising the steps of:

creating a finite element model for the aircraft component describing electromagnetic characteristics of the aircraft component;

transforming the finite element model into a plurality of independent modes;

determining, for each independent mode of the plurality of independent modes, a portion of an electromagnetic field contributed by each independent mode;

summing the portion of the electromagnetic field contributed by each independent mode of the plurality of independent modes to calculate a total electromagnetic field for the aircraft component; and

determining the radar cross section for the aircraft component from the total electromagnetic field.

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Andre Barka and Gerard Bobillot, “*An Efficient Algorithm for the RCS Modulation Prediction from Jet Inlet- Engines*,” IEEE, (1999).

Ahmed Khebir, John D'Angelo, and James Joseph, “*A New Finite Element Formulation for RF Scattering by Complex Bodies of Revolution*,” 41 IEEE Transactions on Antennas and Propagation, no. 5, 534-541 (1993).

Claims 1-20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over the combined teachings and suggestions of Barka and D'Angelo.

We reverse and enter a new ground of rejection.

#### FINDINGS OF FACT

The following Findings of Fact (FF) are shown by a preponderance of the evidence.

##### *Barka*

1. Barka teaches determining radar modulation due to a set of rotating blades computed for only one solution for any blade position. (p. 2566, ll. 6-8 and p. 2567, ll. 11-12.) To determine the radar modulation for a rotating blade, Barka teaches determining a scattering matrix for each angle of interest based on (i) a passing matrix for the angle of interest and (ii) a scattering matrix solved for a reference angle. (p. 2567, ll. 5-13.)

##### *D'Angelo*

2. D'Angelo teaches using a direct three-component formulation to determine electromagnetic scattering of a radar cross section. (Abstract.) To determine the radar cross section, D'Angelo teaches determining a Galerkin-finite element form for a given modal field. (p. 536, left column, ll. 3-6.) A harmonic expansion or Green integral representation is used to calculate radar cross section. (p. 537, left column, ll. 3-6.)

## PRINCIPLES OF LAW

Appellants have the burden on appeal to the Board to demonstrate error in the Examiner's position. *See In re Kahn*, 441 F.3d 977, 985-86 (Fed. Cir. 2006) ("On appeal to the Board, an applicant can overcome a rejection [under § 103] by showing insufficient evidence of *prima facie* obviousness or by rebutting the *prima facie* case with evidence of secondary indicia of nonobviousness.") (quoting *In re Rouffet*, 149 F.3d 1350, 1355 (Fed. Cir. 1998)).

During examination of a patent application, a claim is given its broadest reasonable construction consistent with the specification. *In re Prater*, 415 F.2d 1393, 1404-05 (CCPA 1969). "[T]he words of a claim 'are generally given their ordinary and customary meaning.'" *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (internal citations omitted). "[T]he ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, *i.e.*, as of the effective filing date of the patent application." *Id.* at 1313.

"Section 103 forbids issuance of a patent when 'the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.'" *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1734 (2007). The question of obviousness is resolved on the basis of

underlying factual determinations including (1) the scope and content of the prior art, (2) any differences between the claimed subject matter and the prior art, and (3) the level of skill in the art. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966). *See also KSR*, 127 S. Ct. at 1734 (“While the sequence of these questions might be reordered in any particular case, the [*Graham*] factors continue to define the inquiry that controls.”).

The Supreme Court has “recognized limits to § 101 and every discovery is not embraced within the statutory terms. Excluded from such patent protection are laws of nature, physical phenomena, and abstract ideas.” *Diamond v. Diehr*, 450 U.S. 175, 185 (1981). The Court held that “[a] mathematical formula as such is not accorded the protection of our patent laws.” *Id.* at 191. “[T]he Supreme Court has held that a claim reciting an algorithm or abstract idea can state statutory subject matter only if, as employed in the process, it is embodied in, operates on, transforms, or otherwise involves another class of statutory subject matter, i.e., a machine, manufacture, or composition of matter. 35 U.S.C. § 101. . . . Thus, a claim that involves both a mental process and one of the other categories of statutory subject matter (i.e., a machine, manufacture, or composition) may be patentable under § 101.” *In re Comiskey*, 499 F.3d 1365, 1376-77 (Fed. Cir. 2007). “However, mental processes – or processes of human thinking-standing alone are not patentable even if they have practical application.” *Id.* at 1377.

## ANALYSIS

The Examiner concludes that a combination of Barka and D'Angelo render claims 1-20 obvious. (Ans. 3.) The Examiner relies on Barka to teach a claimed transforming step comprising “transforming the finite element model into a plurality of independent modes” of claims 1, 13, and 17. (Ans. 4, 9, 12, and 15-17.) Appellants do not dispute that Barka teaches a finite element model. (App. Br. 8-9.) Rather, Appellants argue that neither Barka nor D'Angelo teaches or suggests *transforming* the finite element model into a plurality of *independent modes* of claims 1, 13, and 17. (*Id.*) Therefore, the dispositive issue with regard to all claims is whether the combination teaches or suggests the claimed transforming step.

First, we construe the claimed transforming step. Appellants' Specification provides an example of the transforming step as involving generating equations:

a system matrix of the finite element model is transformed using a Discrete Fourier Transform into a plurality of independent modes in a block diagonal matrix. Each independent mode is then solved to determine that portion of the total electromagnetic near-field contributed by each mode.

(Spec. 2:10-14.)

The customary and ordinary meaning of “independent” is “[o]f or relating to a system of equations no one of which can be derived from another equation in the system.” *The American Heritage Dictionary of the English Language* (4<sup>th</sup> ed. 2000), found at [www.bartelby.com](http://www.bartelby.com). Accordingly,

we broadly but reasonably construe the claimed transforming step to involve transforming a finite element model into a system of equations, where none of the equations can be derived from another equation in the system.

Barka teaches determining a radar modulation for a rotating blade by determining a scattering matrix for each angle of interest based on (i) a passing matrix for the angle of interest and (ii) a scattering matrix solved for a reference angle. (FF 1.) Accordingly, the scattering matrices for angles of interest are derived from the *same equation*, namely, the scattering matrix solved for a reference angle. Thus, Barka does not teach or suggest the transforming step because it does not teach that none of the equations in a system of equations can be derived from another equation in the system.

D'Angelo teaches calculating a Galerkin-finite element form for a given modal field and calculating the radar cross section using harmonic expansion or Green integral representation. (FF 2.) However, D'Angelo does not teach transforming a finite element model into a system of equations, where none of the equations can be derived from another equation in the system. Therefore, D'Angelo does not teach or suggest the claimed transforming step.

Accordingly, because neither Barka nor D'Angelo teaches or suggests the claimed transforming step, we find that Appellants have shown that the Examiner erred in concluding that claims 1, 13, and 17 are unpatentable over the combined teachings and suggestions of Barka and D'Angelo.



We acknowledge that Appellants present other arguments of Examiner error, such as the Examiner improperly combined teachings (App. Br. 10-12) and not all elements of claims 3, 6, 16, and 18 are taught (App. Br. 13-14). However, because we find that Appellants have shown that the Examiner erred in rejecting base claims 1, 13, and 17, we do not address Appellants' argument other than the dispositive argument directed to the transforming step. For the same reasons as provided *supra* with regard to claims 1, 13, and 17, we find that Appellants have shown that the Examiner erred in concluding that dependent claims 2-12, 14, and 18-20 are unpatentable over the combined teachings and suggestions of Barka and D'Angelo.

### NEW GROUND OF REJECTION

Using our authority under 37 C.F.R. § 41.50(b), we reject claims 1-12 for failing to recite statutory subject matter under 35 U.S.C. § 101. It is our view that claims 1-12 seek to patent the use of human intelligence in and of itself. The claimed subject matter is not statutory because the cited claims do not necessarily require use of a machine and do not describe a process of manufacture or a process for the alteration of a composition of matter (e.g., there is no requirement that a physical aircraft component is altered as part of this process). *Comiskey* at 1365, 1376-77. A broad but reasonable interpretation of claim 1 requires no more than a mathematical operation by a human. Moreover, dependent claims 6 and 7 define steps in claim 1 as “mathematical representation[s]”. We note that claim 10 recites “modifying the aircraft component.” However, Appellants’ Specification makes clear that the invention is directed to computer simulation or analysis (Spec. 3:20-4:10). Thus, claim 10 does not require modifying a composition of matter such as a physical aircraft component but rather involves modifying a mathematical representation of an aircraft component.

#### *37 C.F.R. § 41.50(b)*

37 C.F.R. § 41.50(b) provides that, “[a] new ground of rejection pursuant to this paragraph shall not be considered final for judicial review.”

37 C.F.R. § 41.50(b) also provides that the Appellants, *WITHIN TWO MONTHS FROM THE DATE OF THE DECISION*, must exercise one of the

following two options with respect to the new grounds of rejection to avoid termination of appeal as to the rejected claims:

- (1) *Reopen prosecution.* Submit an appropriate amendment of the claims so rejected or new evidence relating to the claims so rejected, or both, and have the matter reconsidered by the examiner, in which event the proceeding will be remanded to the examiner ...
- (2) *Request rehearing.* Request that the proceeding be reheard under 37 C.F.R. § 41.52 by the Board upon the same record ...

#### CONCLUSION OF LAW

We conclude that:

- (1) On the record, Appellants have shown that the Examiner erred in rejecting claims 1-20 as unpatentable under 35 U.S.C. § 103(a); and
- (2) Claims 1-12 are unpatentable.

#### DECISION

The Examiner's rejection of claims 1-20 under 35 U.S.C. § 103(a) is reversed.

Claims 1-12 fail to recite statutory subject matter under 35 U.S.C. § 101. A new ground of rejection has been entered under 37 C.F.R. § 41.50(b).

REVERSED  
37 C.F.R. § 41.50(b)

Appeal 2007-2286  
Application 09/610,094

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